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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/226,216	01/07/1999	HISASHI OHTANI	0756-1921	1375

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EXAMINER

SCHILLINGER, LAURA M

ART UNIT	PAPER NUMBER
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2813

DATE MAILED: 07/29/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/226,216

Applicant(s)

OHTANI ET AL.

Examiner

Laura M Schillinger

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 May 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 5-9, 16-18, 20-22, 24-38 and 40-44 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 5-9, 16-18, 20-22, 24-38, 40-44 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

This office action is in response to Amendment E, Paper No. 29, dated 5/5/03.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

2. Claims 5-9 and 16-18, 20-22, 24-38, and 40-44 are rejected under 35 U.S.C. 102(e) as being anticipated by Yamazaki et al ('679).

In reference to claim 5, Yamazaki teaches a method comprising:

Forming a gate electrode and gate insulating film (Fig.5E (510, 509));

forming a semiconductor film comprising amorphous Si (Fig.6C (515; 516; 517; 518);

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crystallizing the film by a heat treatment while a promoting material for facilitating crystallization is retained on or under the semiconductor film (Col.5, lines: 35-40);

removing the promoting material for crystallization from a surface of the semiconductor film after the heat treatment (Col.5-6, lines: 60-15)

promoting crystallinity of the crystallized semiconductor film by irradiation of laser or intense light (Col.7, lines: 45-50);

wherein the promoting material comprises one or more elements selected from the groups consisting of group 14 elements (Col.5, lines: 20-25).

In reference to claim 6, Yamazaki teaches wherein the promoting material is Ge (Col.5, lines: 20-25).

In reference to claim 7, Yamazaki teaches a method comprising:

applying a solution in which a simple substance of a catalytic element for facilitating crystallization of amorphous Si film or a compound containing the catalytic element is dissolved or dispersed, on a semiconductor film comprising amorphous Si (Col.5, lines: 20-35);

baking the film to form a film with a catalytic element on the film (Col.5, lines: 30-40)

crystallizing the amorphous Si film by carrying out a heat treatment (Col.5, lines: 30-40);

and

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promoting crystallinity by irradiation of laser light or intense light, wherein a plural kind of elements selected from elements in group 14 are used as the catalytic element (Col.22, lines: 20-30).

In reference to claim 8, Yamazaki teaches wherein Ge is used as the catalyst (Col.21-22, lines: 65-5).

In reference to claim 9, Yamazaki teaches wherein the compound containing the catalytic element is at least one selected from the group consisting of GeBr (2), GeCl(2), GeI(2), GeO(2), GeS(2), germane, germane acetate, tris (2,4-pentanedionate) germanium perchlorate, tetramethylgermane, tetrethylgermane, tetraphenylgermane, and hexaethyl germanium (Col.22, lines: 1-20).

In reference to claim 16, Yamazaki teaches a method comprising:

Forming a gate electrode and gate insulating film (Fig.6A (513; 514)

forming a semiconductor film comprising amorphous Si on an insulating surface (Fig.6B (515; 516; 517; 518));

forming a film comprising Ge in contact with the semiconductor film by VPD with a Ge gas (Col.22, line:4);

heating the film with the Ge to crystallize the film (Col.22, lines: 15-20);

removing the film with Ge from a semiconductor film without changing the shape of the film after heating the film (Col.22, lines: 30-35).

In reference to claim 17, Yamazaki teaches wherein the film comprising Ge is formed by LPCVD (Col.22, lines: 9-10).

In reference to claim 18, Yamazaki teaches wherein the Ge containing gas is GeH₄ (Col.22, line:4).

In reference to claim 19, Yamazaki teaches further comprising removing the Ge containing film after crystallization (Col.22, lines: 30-35).

In reference to claim 20, Yamazaki teaches a method comprising:

forming a semiconductor film comprising amorphous Si on an insulating surface (Col.21, lines: 55-65);

forming a film comprising Ge in contact with the semiconductor film by VPD with a Ge compound gas (Col.22, lines: 4-10);

heating the semiconductor film with the film comprising Ge to crystallize the semiconductor film (Col.22, Lines: 15-20);

removing the film with Ge from a semiconductor film without changing the shape of the film after heating the film (Col.22, lines: 30-35);

patterning the crystallized semiconductor film into at least one semiconductor island (Fig.6C (515; 516; 517; 518));

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forming a thin film transistor with the semiconductor island used as at least a channel forming region thereof (Fig.6D).

In reference to claim 21, Yamazaki teaches wherein the film comprising Ge is formed by LPCVD (Col. 22, lines:10).

In reference to claim 22, Yamazaki teaches wherein the Ge containing gas is GeH₄ (Col.22, line:4).

In reference to claim 23, Yamazaki teaches further comprising removing the film comprising Ge after the crystallization of the semiconductor film (Col.22,lines: 30-35).

In reference to claim 24, Yamazaki teaches wherein the device is a video camera (Col.25, lines: 35-40).

In reference to claim 25, Yamazaki teaches wherein the device is a mobile computer (Col.25, line: 40).

In reference to claim 26, Yamazaki teaches wherein the device is a portable telephone (Col.25, line:40).

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In reference to claim 27, Yamazaki teaches wherein the device is a head mount display (Col.25,lines: 38).

In reference to claim 28, Yamazaki teaches wherein the device is a projector (Col.25, line:38).

In reference to claim 29, Yamazaki teaches wherein the device is a video camera (Col.25, lines: 35-40).

In reference to claim 30, Yamazaki teaches wherein the device is a mobile computer (Col.25, line: 40).

In reference to claim 31, Yamazaki teaches wherein the device is a portable telephone (Col.25, line:40).

In reference to claim 32, Yamazaki teaches wherein the device is a head mount display (Col.25,lines: 38).

In reference to claim 33, Yamazaki teaches wherein the device is a projector (Col.25, line:38).

In reference to claim 34, Yamazaki teaches wherein the device is a video camera (Col.25, lines: 35-40).

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In reference to claim 35, Yamazaki teaches wherein the device is a mobile computer (Col.25, line: 40).

In reference to claim 36, Yamazaki teaches wherein the device is a portable telephone (Col.25, line:40).

In reference to claim 37, Yamazaki teaches wherein the device is a head mount display (Col.25,lines: 38).

In reference to claim 38, Yamazaki teaches wherein the device is a projector (Col.25, line:38).

In reference to claim 40, Yamazaki teaches a method comprising:

Forming a gate electrode and gate insulating film (Fig.6A (513; 514));

forming a semiconductor film comprising amorphous Si on an insulating surface (Fig.6C (515; 516; 517; 518));

forming a film comprising Ge in contact with the semiconductor film by VPD with a Ge compound gas (Col.22, lines: 4-5);

heating the semiconductor film with the film comprising Ge to crystallize the semiconductor film (Col.22, lines: 15-20);

removing the film with Ge from a semiconductor film without changing the shape of the film after heating the film (Col.22, lines: 30-35);

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irradiating with laser after removing Ge (Col.5, lines: 35-40).

In reference to claim 41, Yamazaki teaches a method comprising:

Forming a gate electrode and gate insulating film (Fig.6A (514; 513)

forming a semiconductor film comprising amorphous Si (Fig.6C (515; 516; 517; 518);

crystallizing the film by a heat treatment while a promoting material for facilitating crystallization is retained on or under the semiconductor film (Col.5, lines: 20-30

removing the promoting material for crystallization form a surface of the semiconductor film after the heat treatment (Col.6, lines: 30-35);

wherein the promoting material is of Group 14 (Col.5, lines: 15-25).

In reference to claim 42, Yamazaki teaches a method comprising:

applying a solution in which a simple substance of a catalytic element for facilitating crystallization of amorphous Si film or a compound containing the catalytic element is dissolved or dispersed, on a semiconductor film comprising amorphous Si (Col.5,lines: 15-21);

baking the film to form a film with a catalytic element on the film (Col.5, lines: 30-40)

crystallizing the amorphous Si film by carrying out a heat treatment (Col.5, lines: 30-40);

removing the film with promoting material from a semiconductor film without changing the shape of the film after heating the film (Col.5, lines: 25-30)

wherein a plural kind of elements selected from elements in group 14 are used as the catalytic element (Col.5, lines: 15-25).

In reference to claim 43, Yamazaki teaches a method comprising:

forming a semiconductor film comprising amorphous Si (Col.5, lines: 5-10);
providing a promoting material for facilitating crystallization is retained on or under the semiconductor film (Col.5,lines: 15-25);
crystallizing the amorphous Si film by carrying out a heat treatment (Col.12,lines: 43-60);
removing the promoting material for crystallization from a surface of the semiconductor film after the heat treatment (Col.6, lines: 15-25);
promoting crystallinity by irradiation of laser light or intense light (Col.7, lines: 45-51);
patterning the semiconductor film into an island (Col.5,lines: 50-55);
wherein a plural kind of elements selected from elements in group 14 are used as the catalytic element (Col.5, lines: 15-25).

In reference to claim 44, wherein removing the film with promoting material from a semiconductor film without changing the shape of the film after heating the film (Col.6, lines: 25-30).

Response to Arguments

Applicant's arguments filed 5/5/03 have been fully considered but they are not persuasive. Applicant argues that with respect to claims 5, 16, 40 and 41 Yamazaki does not teach a reverse stagger-type TFT, however Applicant did not claim a reverse stagger-type TFT in these claims. Therefore, Applicant's argument is not persuasive. Applicant argues further that Yamazaki does not teach promoting crystallinity by irradiation of laser light as claimed in claim

7 and 42; this too is unpersuasive because the laser annealing taught in Col.7, lines: 45-50 is to repair crystalline structure after implanting impurities into the active region. Applicant argues that Yamazaki does not teach to remove the germanium film without changing the shape of the semiconductor film and heating it and then patterning the semiconductor film into an island recited in claim 20. However, Yamazaki teaches to remove the residual Ge without gettering the Ge from the underlying Si film (Col.22, lines: 33-40) and also teaches to pattern the Si film into an island (See Fig.6C), therefore the Ge is removed and the underlying Si layer's shape remains unchanged as claimed. Lastly, Applicant argues that the limitation of claim 43, gettering the crystallinity promoting material and laser annealing to promote crystallinity are not taught by Yamazaki- however Col.6, lines: 15-25 teaches the gettering of Ni and Col.7, lines: 45-50 teaches the repair of crystalline structure by laser anneal. Consequently, Applicant's arguments are deemed unpersuasive.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Laura M Schillinger whose telephone number is (703) 308-6425. The examiner can normally be reached on M-T, R-F 7:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl W Whitehead, Jr. can be reached on (703) 308-4940. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

LMS
July 25, 2003


CARL WHITEHEAD, JR.
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800